Oral health challenges in pregnant women

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REVIEW ARTICLE

Oral health challenges in pregnant women: Recommendations for dental care professionals

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Abstract Pregnancy is a dynamic state leading to several physiological transient changes in the body systems including the oral cavity. In order to maintain good oral health, the dental treatment should not be withheld. The dental management of pregnant patients involves special considerations. This review article discusses common dental problems a pregnant woman faces along with the relevant treatment implications, the risks of various medications to both mother and fetus and common dental problems a pregnant women faces. In addition, the management of related dental problems in the pregnant patients and appropriate scheduling of dental surgical procedures during pregnancy has been discussed.

Contents

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1. Introduction

Pregnancy is a state of physiological condition that brings about various changes in the oral cavity along with other physiological changes taking place throughout the female body.[1] Gingival hyperplasia, gingivitis, pyogenic granulomas and various salivary alterations are some of the changes commonly witnessed among pregnant women.[2] The role of high levels of circulating estrogen is well established and associated with high prevalence of gingivitis and gingival hyperplasia.[3] Progesterone in the serum is also seen to be associated with melasma, presenting a bilateral pigmentation or brown patches in the mid face region.[3,4] A general view of physiological changes on body systems during pregnancy is given in Fig. 1.

Various studies have found evidence linking together poor maternal oral health, pregnancy outcomes and dental health of the offspring.[5] These may range from preterm delivery and low birth weight to higher risk of early caries among infants. Unfortunately, apart from self-maintenance of oral hygiene, pregnant women face several other barriers in achieving optimal oral health.[6,7] These barriers to seeking dental services include lack of knowledge and value, negative oral health experiences, negative attitudes toward oral health professionals and negative attitudes of dental staff toward pregnant women.[8] Similarly, incorrect assumptions, lack of knowledge or experience often plays a role in the hesitance shown by dentists in providing dental care for pregnant women.[2] Oral health promotion, disease prevention, early detection and timely intervention are crucial aspects for maternal and child oral health.[9] It is widely established that many if not all routine and preventive dental procedures can be safely performed throughout the period of pregnancy with certain precautions.[4,10]

An effective model for conceptualizing the management of the dental needs of pregnant women is needed. Such a model should encompass interdisciplinary collaboration between the medical and dental care professionals in order to improve services and referral strategies.[5] The following sections address various facets of management of pregnant patients based on updated guidelines. These are intended as a resource for young clinicians to gain knowledge and confidently cater to the needs of pregnant patients.

2. Common dental problems during pregnancy and management

Like any other system, the oral cavity exhibits a number of changes during pregnancy (Fig. 2) and thus requires special attention by the dental care professionals. Below are mentioned few common dental problems that pregnant women face.

2.1. Dental caries

Pregnant women are more prone to tooth decay due to upturn in the acidic environment of oral cavity, increased consumption of sugary diet and carelessness toward oral health.[11] Recurrent vomiting becomes common in pregnancy that enhances acidic environment leading to progress of carious pathogens and an increased demineralization making teeth prone to caries.[9,10] Untreated carious lesions increase the incidence of abscess and cellulitis.[12]

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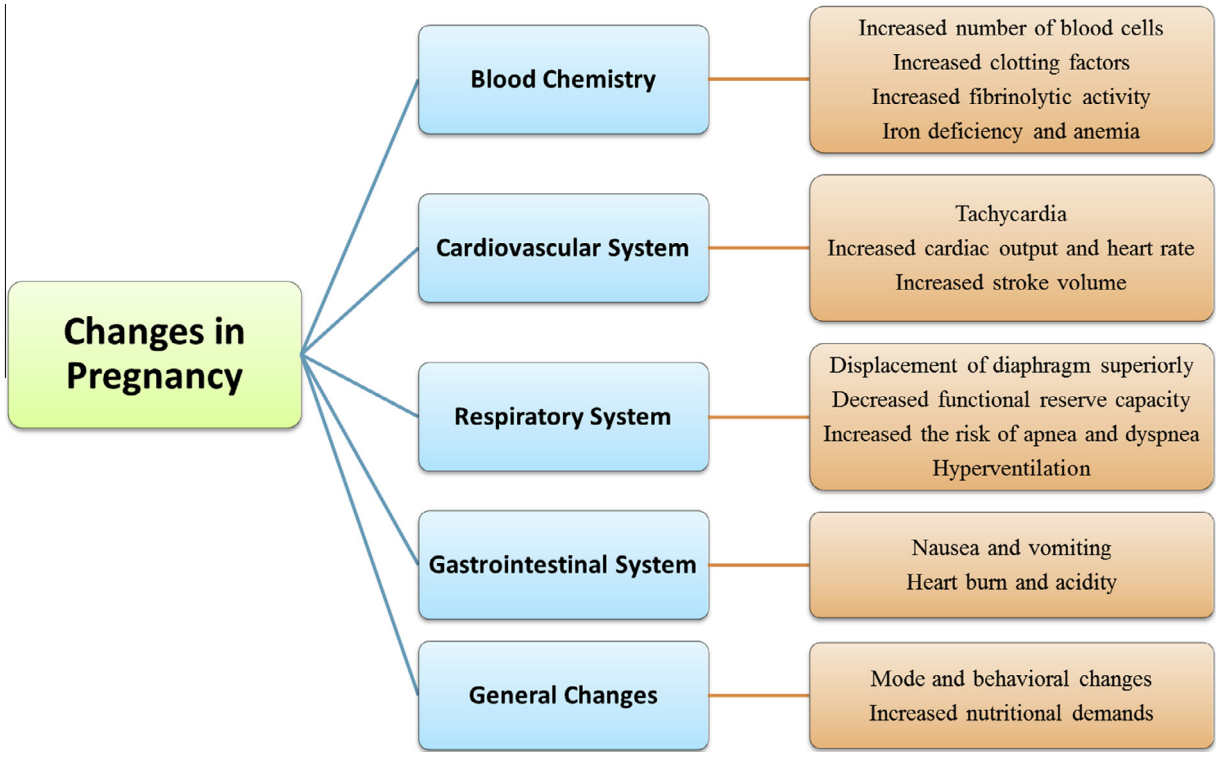

Figure 1 Key physiological change observed in various body systems during pregnancy.

2.1.1. Management

It is advisable for pregnant women to limit sugary diet, brush regularly with fluoridated tooth paste and use over the counter fluoridated mouth rinses to counteract the effect of demineralization due to vomiting. The role of topical applications of fluoride is well accepted for the prevention of caries.[13,14] Fluoride releasing restorative materials such as glass ionomers can inhibit secondary caries.[14–17] In addition, drugs such as methamphetamine that may further aggravate dental caries should be avoided.[18,19]

2.2. Periodontal disease

About 30% of pregnant women suffer from periodontal diseases.[19,20] While the role of elevated levels of circulating estrogen is well established in higher prevalence of gingivitis and gingival hyperplasia during pregnancy,[3] the association between pregnancy and oral diseases like periodontitis require further research. The role of elevated levels of inflammatory markers (i.e. interleukin 6, interleukin 8 and PGE2) has been found in the amniotic fluid of child bearing women having periodontal conditions, which is considered to be associated with premature labor and low birth weight.[8,21,22]

2.2.1. Management

Recent evidence clearly demonstrates that scaling and root planning is considered safe during pregnancy and improves both maternal and neonatal health.[8] The management strategies to overcome periodontal disease in pregnant females embraces vigilant diagnosis by the dental health care professional, root planning/deep scaling and prescribing 0.12% daily chlorhexidine mouth rinses to limit the progress of disease. Chlorhexidine is categorized as FDA class B and measured safe to practice in pregnant women.[23]

2.3. Gingivitis

Gingivitis or bleeding tender gums is the most common dental problem and contributes to around 60–70% of pregnant women. Such conditions are common due to decreased immune response, hormonal fluctuations of estrogens and progesterone and changes in normal oral flora.[24,25]

2.3.1. Management

Commendations to improve the condition may comprise professional prophylaxis i.e. scaling, daily fluoridated tooth brushing, flossing and saline mouth rinses should be encouraged that may help in easing the irritant. In addition, chlorhexidine mouth rinses may provide added benefit.[26,27]

2.4. Tooth mobility

Due to hormonal rush mineral changes in lamina dura and disturbance in the periodontal ligament attachment, affect mobility of teeth leading to periodontal diseases.[31,32]

2.4.1. Management

This condition can be made reversible if given therapeutic doses of vitamin C along with removal of local gingival irritants.[28,29]

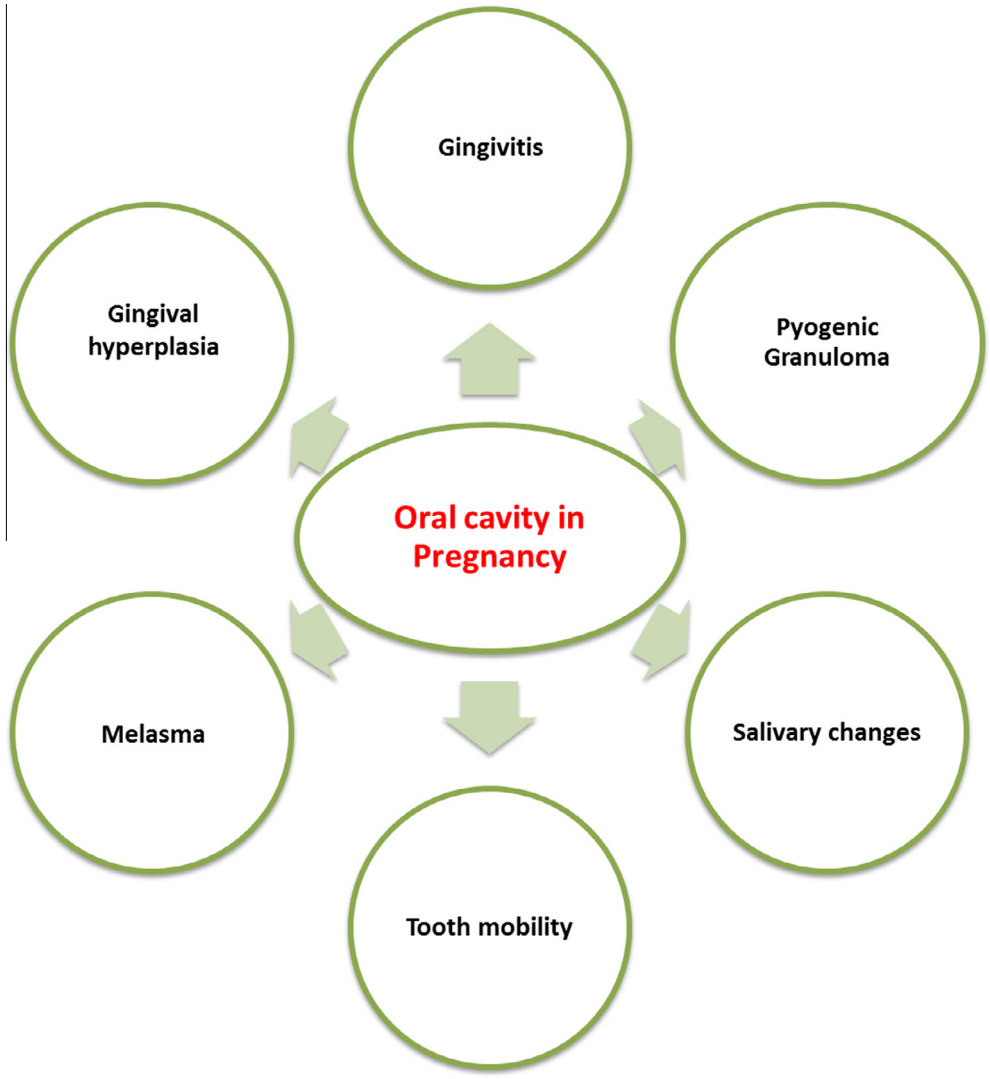

Figure 2 Key oral changes and conditions during pregnancy.

2.5. Tooth erosion

Tooth erosion, another unwanted dental problem is considered to be caused by pregnancy induced vomiting. It is understood that dental erosion can be effectively controlled with the use of a solution containing sodium bicarbonate that neutralizes the acid and prevents damages.[30] It is advised to consult patient's physician and gastroenterologist to control the related medical conditions.

3. Suitable timings and dental management

To preserve and promote oral health; scaling, polishing and root planning are recommended at any stage of pregnancy.[21,22] However, it is strictly advised to perform general dentistry procedures (i.e. routine restorations, endodontic therapy and elective extractions) after fetal organogenesis has taken place (i.e. in second and third trimester). Extensive and prolonged dental procedures should be postponed till after delivery.[3] All treatment modalities should focus on the prevention of oral diseases, regular monitoring and management of present disease (Fig. 3).

4. Dental chair positioning and pregnancy

When performing chair side procedures it is of great importance to make sure that the pregnant patients are seated in the correct and safe position (Fig. 4). This helps to avoid any complication such as supine hypotensive syndrome in the dental chair. For example, if a pregnant lady is seated in the supine position, there are great chances of progression to medium hypoxemia and an abnormal arterial oxygen gradient. Similarly there is a risk of compression of the vena cava and aorta due to the gravid uterus which may lead to postural hypotension. Therefore it is important that the dealing dentist makes her sit in the right position; i.e. either seated with her right hip elevated 10–12 cm so that the pressure on the vena cava is reduced or by placing the patient in a 5–15% tilt on her left side. In case the hypotension is not relieved, the patient should be asked to acquire a full left lateral position. These

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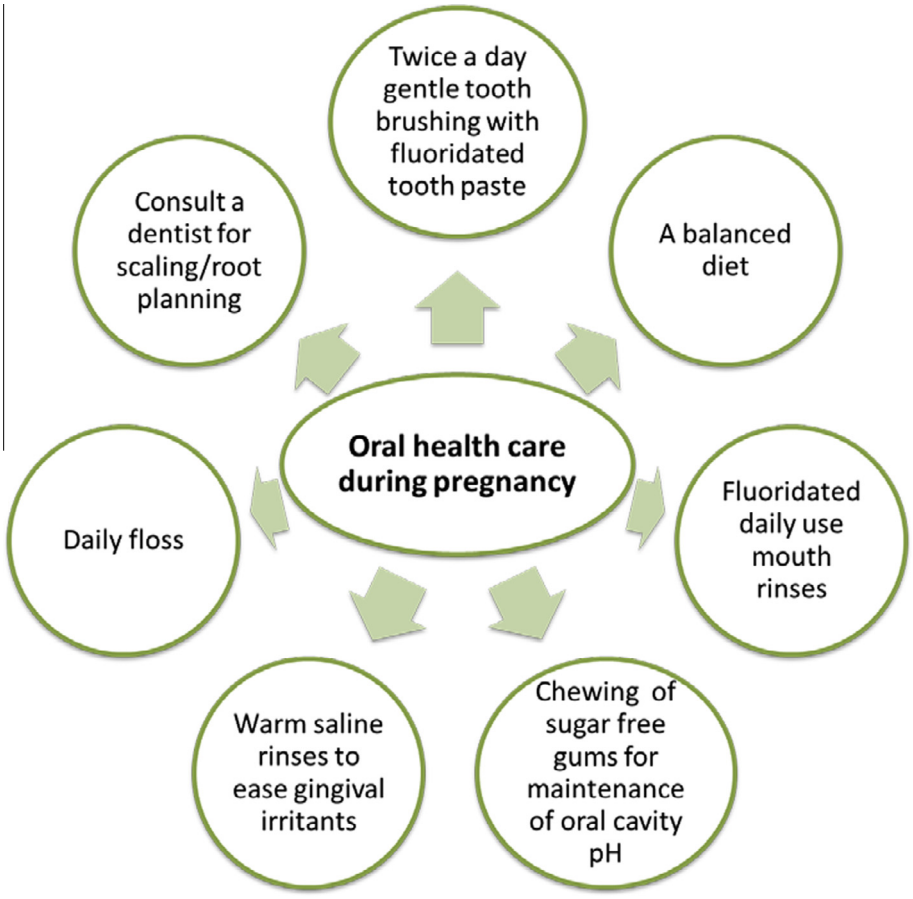

Figure 3 Oral health care measures adopted during pregnancy.

modifications are however recommended during the third trimester.[2,4,10]

5. Pharmacodynamics and pregnancy

Pregnancy is a phase having a high volume of drug distribution, decline in maximum plasma concentration, shorter plasma half-life, rise in lipid solubility and rate of clearance.[6,31] Such dynamics contribute to an easy access of boundless drugs through the placenta, therefore compromising the health of the fetus. In addition these drugs may result in low birth weight, teratogenicity and further adverse effects leading to miscarriage. Therefore during this phase, the use of drugs is not recommended, especially during the first 13 weeks i.e. the first trimester. Due to potential adverse effect of drugs and for a safer approach, drugs have been categorized based on the risk and hazards to the fetus.[6,31] Food and Drug Administration (FDA), USA has categorized drugs based on their potential risk factors during pregnancy (Table 1).

5.1. Analgesics

Analgesics are used for a short or limited span of time to treat, cure and minimize the hassle of pain. Acetaminophen is the most common and safest analgesic used in pregnancy and is categorized in group B by the FDA classification.[32] The most reported side effect of acetaminophen is hepatotoxicity. Due to their availability in different formulations it is advised that a pregnant woman should not exceed more than 4 grams per day.[32] Other analgesics such as ibuprofen is sorted in category B classification in first and second trimesters but changes to category D in the third trimester as the drug is associated with lower amniotic fluid, premature heart valve closure and limits the vaginal opening during labor.[23] Dentist should recommend acetaminophen with codeine or oxycodone but prolonged use is not suggested as it may result in neonatal depression. In general, this apparently is not of worry as the dose regimes are characteristically approved in connotation with dental treatment.[32]

5.2. Antibiotics

Most antibiotics permitted by the dentist belongs to category B of FDA classification with exemption of gentamycin and doxycycline both of which fits in to class D (Table 1). Gentamycin is reported to cause fetal ototoxicity whereas doxycycline and its derivatives cause tetracycline staining of teeth and has a hostile effect on developing bones. A ciprofloxacin (fluoroquinolones) broad spectrum antibiotic is commonly prescribed in periodontal diseases associated with actinobacillus. Recent developing evidence suggests that this drug is involved in arthropathy and has severe effects on evolving cartilages and

Table 1 FDA risk categories of drug used during pregnancy and their potential risk factors.

Category	Risk factors	Antibiotics	Analgesics	Sedative hypnotics	Local anesthetics
A	Satisfactory well controlled studies on humans showing no hazard to the fetus				
B	Studies on animals demonstrating no fetal risk whereas no well controlled and adequate studies done on pregnant women	Amoxicillin Cephalexin Chlorhexidine Clindamycin Erythromycin Metronidazole Penicillin	Acetaminophen Ibuprofen		Lidocaine Prilocaine Prednisolone
C	Studies on animals establishing fetal hazards no controlled studies on human beings	Ciprofloxacin	Codeine with acetaminophen Hydrocodone + acetaminophen Propoxyphene		Mepivacaine
D	Evidence of risk to the fetus, can be used in exceptional cases or circumstances	Doxycycline Tetracycline (D)	Ibuprofen	Barbiturates Benzodiazepines	
X	The hazards of using the drug in pregnant women far more than the benefits				
		Nitrous oxide (avoided in the first trimester as it may result in neonatal depression and spontaneous abortion)			

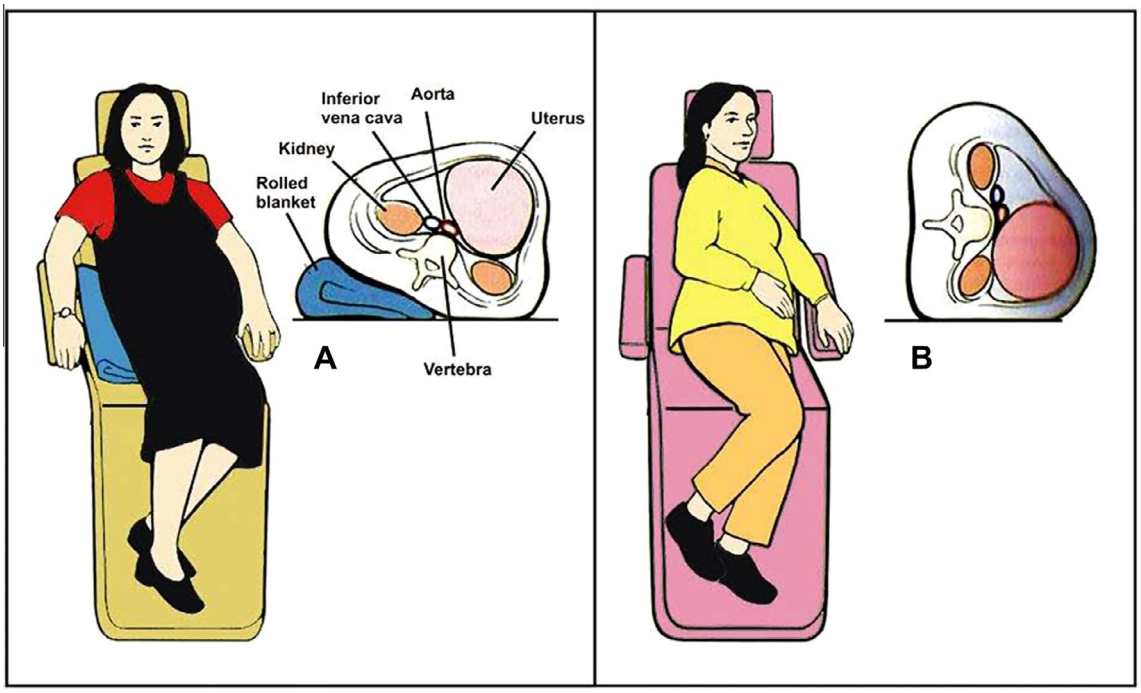

Figure 4 Schematic presentation of correct dental chair positioning for pregnant patients.

is not recommended in pregnant women.[33] Metronidazole classified in group B is prohibited to be used in first trimester as the drug has teratogenic effects.[34]

5.3. Local and general anesthetics

Localized use of anesthetics is considered safe when given properly and in precise dose. Anesthetics such as lidocaine and prilocaine are categorized in class B whereas, mepivacaine, bupivacaine and epinephrine fits in class C of the FDA classification.[23] Epinephrine with local anesthetics when administered through an intravascular route theoretically may be associated with insufficiency of the utero-placental blood flow but the reported cases in healthy pregnant women are 1:100,000.[35] The concentration of epinephrine in a local anesthetic used in dentistry is considered safe provided a check is

kept on the proper aspiration technique and the amount injected.[35] On the other hand when doing elective surgical procedures under general anesthesia, it is important to keep in consideration the following aspects in relation to the growing fetus;

- The fetal oxygenation should be retained by maintaining maternal $PaCO_2$ and PaO_2.
- The use of teratogenic agents should be avoided.
- Premature labor should be prevented.

Nitrous oxide is the anesthetic of choice and most commonly used in surgical procedures. Nitrous oxide is not listed in the FDA classification as its use during pregnancy is still controversial.[36] The drug is reported to be involved in preterm birth, abortions and birth defects. Though the correct timings of long and extensive surgical procedures should be delayed till after delivery but if a surgical procedure is to be performed in urgency in pregnant women, low levels of nitrous oxide should be administered, prophylactic dose of folic acid, methionine and vitamin B12 should be prescribed during first trimester. It is best to avoid N_2O during first trimester as the hazards clearly outweigh the benefits.[36–38]

Table 2 Drugs and maternal teratogens and possible undesired effects.

	Known side-effects
Drugs teratogens	
Alcohol	Cranio-facial abnormalities, fetal alcoholic syndrome
Tobacco	Brain damage, cleft lip and palate
Cocaine	Placental abruption, cognitive delay
Thalidomide	Malformation of extremities of new born
Methyl mercury	Brain damage, microcephaly
ACE inhibitors	Cranio-facial abnormalities
Valproic acid	Mental retardation, neural tube effects
Tetracycline	Maternal toxicity and discoloration of tooth
Phenytoin	Hypoplastic nails, typical facies
Warfarin	Facial dysmorphism, chondrodysplasia
Benzodiazepines/ barbiturates	Cleft lip and palate deformities
Maternal teratogens	
Toxoplasmosis	Spinal abnormalities, brain dysfunction
Chlamydia	Conjunctivitis, pneumonia
Hepatitis B	Liver damage
Parvovirus	Anemia
Chicken pox	Eyes damage

6. Oral and dental health management guidelines during pregnancy

Oral health care management of pregnant patients is considered to be a very important aspect. It is recommended to assess patient's current dental health status and then to educate her about the expected changes during pregnancy and measures that can be helpful to avoid pain and distress. The dental examination and treatment causes no harm to the fetus (during second and third trimester) in contrast to that if left untreated, e.g. dental decay may cause infant caries at a later stage.[39] Similarly other procedures such as diagnosis, periodontal treatment, restorations and extractions are of no harm and are recommended to be performed during the middle trimester as organogenesis is complete by then.

6.1. First trimester

The first trimester is not considered to be an appropriate time for performing procedures. Organogenesis takes place during this period and is prone to risk of teratogens. Also the risk of spontaneous abortions increases. Following guidelines should be followed during this time:

- The individual should be well educated about the oral changes taking place.
- Instructions to maintain oral hygiene.
- The treatment should be limited to periodontal prophylaxis and emergency treatment.
- Avoid routine radiographs.

6.2. Second trimester

- In this trimester the organogenesis phase is complete and procedures such as emergent dento-alveolar and other electives procedures are safe to perform. Recommendations during this pace include: maintenance of oral hygiene and plaque control.
- It's safe to perform scaling, polishing and curettage if necessary.
- Active oral diseases should be controlled.
- It's safe to perform elective procedures i.e. root canal, extraction, restorations.

6.3. Selective radiographs can be taken third trimester

It is appropriate to perform short dental procedures during the third trimester as there is not significant risk to the fetus. However, there is an increased risk of discomfort to the mother that can be reduced to a greater extent by proper positioning (Fig. 4). The recommended time to perform procedures is during the middle of the third trimester. The following measures are recommended during third trimester:

- Maintenance of oral hygiene and plaque control.
- It's safe to perform scaling, polishing and curettage if necessary.
- Active oral diseases should be controlled.
- It's safe to perform elective procedures.
- The radiograph use should be minimized.
- Procedures not to be performed after mid time of the third trimester.

7. Dental radiations and pregnancy

Current evidence suggests that 'dental radiography' is measured as harmless in child bearing women. The safety directly rests upon the type and amount of radiations to which the

patients is exposed. Special precautionary measures should be guaranteed for pregnant women (e.g. thyroid collar, lead apron, and speed films) because the risk to the growing fetus is directly connected to rise in exposure.[40] Fetus radiation exposure over 10 rads is considered to be hazardous and may contribute to mutation, mental retardation and abnormalities of the eyes. It's uncommon for a single X-ray or collection of investigative X-rays to exceed 5 rads.[40] For instance, the volume of radiation that a baby acquires from a mother's dental X-ray is only 0.01 millirads. Since a rad is equivalent to 1000 millirads, one would have to have 100,000 dental X-rays for the baby to receive just one rad.[41]

The risk from the X-rays (diagnostic) is very low. The experts, however, often recommend delaying exposure to radiations until birth. If the dentists require X-rays for any particular condition, the amount of radiation to the growing fetus must be well within the safe range.[40] Also, every protection should be taken to reduce radiation contact using shielding thyroid collars and aprons whenever possible.[41,42]

8. Teratology

A teratogen is defined as an agent that causes permanent alterations in the form or function of offspring upon exposure to the fetus (Table 2).[43,44] There is a wide range of medications that can lead to teratogenic effects and thus can be a reason to cause both functional and structural birth defects. Potential teratogenic medications include alcohol, tobacco, cocaine, thalidomide, methyl mercury, anticonvulsant medications, warfarin compounds, ACE inhibitors, certain antimicrobials, retinoids, penicillamine tetracycline, trimethadione, valproic acid and phenytoin. The period that is considered to be most prone to teratogens is the embryonic period (first trimester). However, teratogen exposure does not harm much after development of venerable structures with the exception of tetracycline that may cause yellow brown discoloration of deciduous teeth even during the second half of pregnancy.[43]

9. Conclusions and recommendations

Pregnancy should not be considered as an absolute reason to defer required dental care. Oral care during pregnancy is very important and involves the contribution of the patient herself, dental professionals and physicians. Pregnant patients must be educated about the importance of maintaining good oral hygiene, expected changes in the oral cavity and routine dental visits. Dental health professionals must be aware of updation of pregnancy related conditions and their proper management without harming the patient and fetus. Considering the best level of patient's care, referral and consultation to patient's gynecologist's or physician should be considered. Drug therapies should be limited and carried out carefully. It is better to avoid radiography and elective surgery. Female patients of childbearing age or expecting females should be screened for caries and oral diseases for timely management.

Conflict of interests

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